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Adaptation of Models and Theories for Supply Chain Management Efficiency: A Review Paper

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Abstract

An efficient supply chain has become critical for any organisation to have competitive advantage in a globally linked supply chain environment. There are a number of models and theories of supply chain management evolved through since the last few decades. The purpose of this paper was to review such models and theories and find out any link between adaptation of such models and theories and the supply chain efficiency.

Keywords: supply chain models, supply chain theories, efficiency, drivers of SCM

1. Introduction

In the globally networked market, it has become indispensable for an organisation to reduce total cost of supply chain management to be competitive in the industry. It is also very crucial to eliminate the waste across all the drivers of supply chain. In this regard, identification and implementation of models and theories that can help in reducing cost and waste in the system is very important. Ven (1989) stressed that a good theory helps in explaining the major causes for any empirically observed pattern. The power of good decision is based on good

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theories (Lewin, 1951).

Reviewing the literature on supply chain management models and theories revealed that there are significant relationship between adoption of appropriate models and theories and efficient supply chain management. This paper plans to explore to what extent, the models and theories of SCM (supply chain management) are tied to bringing efficiency to supply chain management. It can be assumed that those SCM models and theories, which cover the efficiency aspect of supply chain management, can be considered as models and theories for supply chain efficiency.

To help achieve this objective, this paper begins with a brief overview defining the SCM models and theories. Next, some background and brief historical academic perspective on the topic of supply chain efficiency are provided. The major portion of this paper is anchored on the use of a number of SCM models and theories, which can be linked to supply chain efficiency. Authors believed that this study could support the body of knowledge to give another insight in the area of the supply chain efficiency.

2. Approach

The author conducted an extensive literature review of supply chain models and theories that were published in leading national and international journals. Based on Brown and Dant's (2009) study, the authors used the incidence of models and theory of SCM as the unit of analysis. Some of the vastly used models and theories of SCM were selected for discussion in this study.

3. Background

Today, delivering value to the customer is more important than just creating the value.

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Enhancing the demand fulfilment capability and demand chain management are new success factors substituting the old success factors such as forecasting demand and supply chain management (Chopra, 2013). Cost of distribution has become a key to the profitability of any organization. In the US economy, distribution related costs, accounts to approximately 10.5 percent. Consistent with this, Companies such as Wal-Mart and Seven Eleven Japan attributed their success to their distribution design, and efficient operations.

4. Models of Supply Chain Management and Supply ChainEfficiency

Design of distribution network significantly influence the supply chains cost including inventories costs, transportation costs, facilities and handling costs, and information costs. Costs components and the customers service were the measures used to evaluate the performance of delivery networks. It is difficult for the distribution network to outperform in all the dimensions (Chopra, 2013).

4.1. Manufacturer Storage with Direct Shipping or DropShipping

Under this model, products are delivered directly to the customers bypassing the retailers. Although information flow from customers to retailer and from retailer to manufacturer. The manufacturer sends the product directly to the customers (Chopra, 2013).The advantage of this model is the ability to centralize inventory at the manufacturer. Inventory costs are low in this model but the transportation costs tend to be higher because ofthe average outbound distance to the customers. By eliminating, the need of warehousing, facilities cost (fixed) is saved. Handling costs can also be lowered because the products are transferred directly to the customers. Response time is long because the order is transmitted from the retailers to the manufacturers and the shipping distance are higher from the manufacturers' site.

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A good information infrastructure can help the retailers and customers to view the position of products and inventory in the system. However, establishing of information set up incurcost. However, delivering at the customer place provides good customer experience, yet the handling of returns in expensive. This model is suitable for a large variety of low demand, high value products for which customers can wait for delivery and accept several partial shipments (Chopra, 2013).

4.2. Manufacturer Storage with Direct Shipping and In-TransitMerge

Unlike the drop-shipping model, in transit merge combines individual orders coming from different location to provide a single delivery to the customers. This model issuitablewheretheretailerissourcingmediumdemand,highvalueitemfromalimitednumber of manufacturer (Chopra, 2013).Under this model, bulk transportation and consolidation lead to reduction in transportation cost. Lowering inventory requirement at customer's end ensures better customer service. However, it increases the logistics cost due to increaseininventorycarryingcostandwarehousingfacilitiescoststosuppliers(Agrawal, 2008). In addition, a very sophisticated information infrastructure is needed to have coordination among manufacturer, retailer and carrier that in turn requires higher investment. Besides, the implementation of reverse supply chain management is also very difficult and expensive.

4.3. Distributor Storage with CarrierDelivery

Under this model, distributor or retailer holds inventory. Package carriers transport the products from the intermediate location to the final customer. This is suitable for serving the customers who need smaller lot sizes (Chopra, 2013).In this

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model,distributororretaileraggregatedemandatalowerlevel.However,duetotheproximity ofinboundshipmenttothecustomersandbundlingofdifferentorderstoasingleshipmentthe costsoftransportationisreduced(Agrawal,2008).Thoughthefacilitycostsarehigher,yetthe processing and handling costs are comparable to manufacturer storage. Moreover, a simple informationinfrastructureisrequiredtohaverealtimevisibilitybetweenthecustomersand distributors (Chopra,2013).

4.4. Distributor Storage with Last-MileDelivery

Under this model, the distributor or retailer delivers the products to the customer at their home without using a packaged carrier. Distributor storage with last mile delivery requires higher level of inventory as compared to any other options except for retail stores. It is suitable for fast moving items but the transportation cost is higher. However, higher transportation costs is justifiable, when the product is bulky and the customer is willing to pay for it.This model is less expensive in large and dense cities. In addition, facility and processing costs are higher because of the large number of facilities. Besides, handling of returns is expensive (Chopra, 2013).

4.5. Manufacturer or Distributor Storage with CustomerPickup

In this model, customers' orders are made online or on the phone and pick up of merchandise is arranged at the manufacturer's or distributor's warehouse. Due to the aggregation by manufacturer and distributor, inventory cost can be kept low. Further, the use of truckload and less than truckload transportation by package career helps in reducing the overall transportation costs. However, facility cost increases with the addition of pick up sites.

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Moreover, significant information infrastructure is needed for the coordination and visibility among retailer, storage location and pickup location (Chopra, 2013).

4.6. Retail Storage with CustomerPickup

Under this model, inventory is stored at retail stores. Customers can order in person or online or by phone and pick up their order at retail outlets. Some firms keep their inventory at pick up locations also. Due to lack of aggregation, local storage increases costs. However, the cost of transportation is relatively low because of the use of inexpensive mode of transportation to replenish products at the retail store. On the other hand, the requirement of large number of local facilities increases the facility costs. It is also very expensive to maintain high level of product variety at retail storage (Chopra,2013).

5. Theories of Supply Chain Management and Supply ChainEfficiency

Theories are the pillars of foundation in supply chain. They help in understanding the evolution of supply chain management (Parkhi, 2015).From the earlier notions of the previous researchers; the author has compiled the following supply chain theories:

5.1. Resource-based View (RBV)

According to resource-based theory, the tangible and intangible resources of the organization affect the creation, sustainability, and competitive advantage of the organisation (Kor& Mahoney 2004). RBV put forward that each level of supply chain can get competitive advantage by means of having valuable, priceless and rare resources (Ketchen&Hult, 2007). In SCM, outsourcing decisions are based on core competencies and complementary capabilities of other organisations.

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5.2. Transaction Cost Analysis(TCA)

Transaction cost theory focuses on overall transaction costs rather than the cost of individual transactions (Manzouri& Rahman, 2013).This theory can be used to explain efficiency as an object for entering inter-organizational arrangements .It provides a boundary within which a firm has to operate efficiently. Furthermore, the transaction costs is depended upon the behavior of the partners who are looking for mutual opportunities (Andersson,1997).However, organisational costs can be reduced through vertical integration and developing trust among channel partners. It can also be achieved by horizontal interaction and achievement of economy of scale by aggregating supply and demand.

5.3. Knowledge –based Theory(KBT)

The exchange of knowledge facilitates the integration and performance of supply chain and enhances collaboration among inter-organizational supply chains (Grant, 1997).The knowledge, when shared, understood and combined can create a common identity. Besides, common organisational code lowers the cost of communication. It can reduce transactions costs also (Poppo& Zenger, 1999).There is a greater chance of improvement in the process of innovation in SCM by knowledge sharing among the partners (Miles & Snow, 2007).

5.4. Strategic Choice Theory(SCT)

Organizational outcomes are the result of strategic decisons.Strategic choice theory is less concerned about the functional operations of the organisation and is more concerned about the governance structure and political actions in organisations .The main emphasis of this theory is the establishment of structural forms, the manipulation of environmental factors and choice of performance standard (Child,1972).Therefore, The supply chain decisions should be used as primary driver in all strategic decisions at all level of distribution channel (Miles &

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Snow,2007).Likewise, any technological change such as employing RFID technology or ERP system, require decision from top manager and support from managers at all levels (Lavassani,2008).

5.5. Agency Theory(AT)

According to agency theory, an agency relationship arises when the principal appoints an agent to perform some of his task and authorises him with decision-making (Parkhi, 2015). This relationship can be negative or positive. Under the positive or contemporary view of agency theory, the goal of the organisation is survival and value creation .The agent operates in an open system to gain competitive advantage through integration and coordination of their relevant environment (Beckert&Zafirovski, 2013).However, the appointment of agents involves some costs (Parkhi,2015).

5.6. Institutional Theory(InT)

Institutional theory view the organization as an open system that lays emphasis on the influence of environment on organisations. It helps in understanding and implementing the actions and practices of other successful organizations (DiMaggio & Powell, 1983).

5.7. Systems Theory(ST)

The focus of systems theory was on providing interface between various functions in the organisation such as marketing, distribution and production (Ballou, 1978).The theory endorses integration across the supply chain. It gives prominence to the efficiencies and the role of inter organisational processes. The theory put emphasis on efficiency related issues such as time-based management, lean production, customer response efficiency and value chain concepts.

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5.8. Network Theory(NT)

It is concerned with inter organisational relationship (Moller & Wilson, 1995). This relationship enhances the exchange process wherein the firms exchange goods, services and information (Johanson&Mattsson, 1987.The theory views the resources of the organization as means of competitive advantage (de Koster, 2002).Moreover, firms combine together to develop synergies and form new resources from each other's strength (Parkhi,2015).

5.9. Social Exchange Theory(SET)

Social exchange or social capital theory suggest that the performance of organization can be improved by coming together for solving problems and sharing experiences, information, goals and values among supply chain partners (Halldorsson, 2007).

5.10. Organisational Learning Theory(OLT)

Organisational learning theory emphasises on the different type of learning in an organization. This learning helps the organization in making strategic alliances with supply chain partners by knowing and using their knowledge (March, 1991).

5.11. Just In Time(JIT)

ust- in- time theory suggests the lessening of the process inventory and reducing the associated carrying costs. According to this theory, products should be produced and delivered in the right time. They should be produced in the right quantity with the right quality and should be delivered at the right place (Svensson, 2001)

5.12. Theory of Constraints (TOC)

Theory of constraints compares organization as a chain of many links. Like the chain, the

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organization's performance is limited by the performance of the weakest link. When the constraint or the weakest link is removed or minimised, the performance of the overall system is improved (Dettmer, 1997).

5.13. Total Quality Management(TQM)

Total quality management stresses upon the improvement of not only the quality of products and processes but also on the improvement of all supply chain activities to generate competitive advantage (Cua, 2001).

5.14. Quick Response Manufacturing(QRM)

Quick response manufacturing theory emphasis on the reduction of internal and external lead times across organisations. It focuses on the strategic role of time in generating competitive advantage to the organization (Thomas, 2008).

5.15. Information Asymmetry Signaling Theory (IAST)

The theory suggest that the unequal information among supply chain partners results in asymmetric information. This asymmetric information would prove detrimental for the management of the organisation as a whole (Simpson, 2007).

6. Conclusion

From the above discussion, it can be inferred that there is no single model or unified theory of supply chain management. Each model and theories has its own strength and weaknesses. A network designer needs to consider the product characteristics, network requirements and the overall strategy of the firm, when deciding on the selection of

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deliverymodel.MostofthecompaniessuchasW.W.GraingerandAmazonuseacombination of delivery networks (Chopra,2013).

The supply chain is a meta-organisation built up by several individual organisations. These organisations establish inter-organisational relationships and integrated business processes. The inter-organisational relationship management is critical for achieving the objective of improving the overall profitability of the firm. However, one can choose a dominant explanatory model or theory and supplement it with one or more of other models and theories depending upon the situation. Along the lines of above discussion, all the mentioned models and theories should be viewed as complementary as well as mutually exclusive (Halldorsson, 2007).

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